We Claim:

1. An optical connector, comprising:

a flexible strip having a plurality of optical waveguides formed in a plurality of waveguide layers for providing a plurality of optical paths between opposing ends of said flexible strip, at least one of said optical paths running through at least two waveguide layers.

2. The optical connector of claim 1, wherein said flexible strip further comprises at least one pass-through between waveguide layers such that at least one of said optical paths is routed through at least two waveguide layers.

3. The optical connector of claim 2, wherein said at least one pass-through includes a complementary pair of reflective angled surfaces, one of said pair being positioned in each of said two waveguide layers, for redirecting light between said two waveguide layers.

4. The optical connector of Claim 1, wherein said waveguide has a thickness of from about 50 to about 1000 μm.

5. A backplane structure comprising the optical connector of claim 1 mounted on a backplane substrate and further comprising a mounting structure for positioning and retaining at least two optical circuit board adjacent to respective ends of said flexible strip to provide a plurality of optical paths for communicating optical signals between the optical circuit boards.

6. The backplane of claim 5 further comprises a plurality of electrical traces for communicating electrical signals between said optical circuit boards.

7. The backplane of claim 5 wherein at least two of said optical paths within said flexible strip cross over.

8. An optical backplane adapted to accept a plurality of optical circuit boards and optically connect one or more optically active areas of said accepted optical circuit boards, comprising:

a substrate;

a mounting structure for retaining and positioning the optical circuit boards on said substrate; and

an optical interconnect structure having a plurality of waveguides formed in a plurality of waveguide layers, each waveguide having a pair of waveguide ends defining a light path therebetween for communicating light signals between said optical circuit boards.

9. The optical backplane of claim 8, wherein at least two of said waveguide paths cross.

10. The optical backplane of claim 9, wherein said optical interconnect structure comprises a

flexible strip mounted on said substrate.

11. The optical backplane of claim 10 wherein said flexible strip comprises a plurality of waveguide layers and at least one pass-through for redirecting light traveling in one of said waveguide layers to another of said waveguide layers.

12. The optical backplane of claim 11 wherein said pass-through comprises a complementary pair of angled reflective surfaces.

13. The optical backplane of claim 10, wherein said flexible strip has a thickness of from about 50 to about 1000 μm.

14. The optical backplane of claim 8 wherein said mounting structure comprises a plurality of bracket pairs.

15. An optical backplane, comprising:

a substrate;

a mounting structure for removably retaining and positioning a plurality of optical circuit boards;

a flexible strip mounted on said substrate, said flexible strip comprising a plurality of waveguide layers having a plurality of optical paths formed therein, each of said optical paths having an input port for receiving light from one of the optical circuit boards and an output port for transmitting light to another of the optical circuit boards.

16. The optical backplane of claim 15, said flexible strip further comprising at least one cladding layer separating adjacent waveguide layers, and where at least one of said optical paths includes portions within at least two of said plurality of waveguide layers.

17. The optical backplane of claim 16, wherein said waveguide further includes at least one pass-through between said two waveguide layers.

18. The optical backplane of claim 17, wherein said at least one pass-through includes a complementary pair of angled reflective surfaces for redirecting light from one of said waveguide layers to another of said waveguide layers.

19. The optical backplane of claim 18 wherein at least two of said optical paths cross over each other.

20. The optical backplane of claim 15, wherein said flexible strip has a thickness of from about 50 to about 1000 μm.

21. The optical backplane of claim 15 wherein said waveguide layers are formed from an

optically transparent polymer.

22. The optical backplane of claim 21 wherein said optically transparent polymer is a polyimide.

23. A method of forming an optical backplane for optically connecting a plurality of optical circuit boards, comprising:

forming a flexible strip comprising a plurality of optical paths formed in a plurality of waveguide layers;

mounting said flexible strip on a substrate; and

attaching a mounting structure on said substrate for removably retaining and positioning optical circuit boards in a location adjacent to the ends of said optical paths.

24. A method of forming a flexible optical interconnect structure, comprising:

forming a sacrificial layer on a temporary substrate;

depositing a first cladding layer on said sacrificial layer;

forming a core layer on the top of said cladding layer;

forming a first core pattern on said cladding layer from said core layer such that a portion of the top of said first cladding layer is exposed;

depositing a second cladding on said first core pattern and exposed portion of said first cladding;

removing said sacrificial layer and said temporary substrate to expose the bottom of said first cladding layer;

forming a second core layer on the bottom of said first cladding layer;

forming a second core pattern from said second core layer such that a portion of the such that a portion of the bottom of said first cladding layer is exposed; and

depositing a third cladding on said second core pattern and exposed portion of said first cladding.

25. The method of claim 24 further comprising mounting the resulting structure on a flexible support.

26. The method of claim 24 wherein said core and cladding layers are formed from optical polymers.

27. The method of claim 24 wherein at least one of said core patterns includes an angled surface.

28. The method of claim 27 wherein said angled surface is coated with a reflective layer.

29. A method of forming a flexible optical interconnect, comprising:

forming a bottom waveguide layer comprising a first light path and including a bottom cladding layer;

separately forming a top waveguide layer comprising a second light path and including a top cladding layer; and

thereafter joining said top cladding layer to said bottom cladding layer.

30. The method of claim 29 wherein said top and bottom waveguide layers have complementary pass-through structures formed therein, such that when said layers are joined together light traveling in said first waveguide layer will be redirected by said complementary pass-through structures into said second light path.

31. A method of forming a flexible optical interconnect, comprising:

forming a first cladding layer over a flexible polymer substrate;

forming patterned structure over said lower cladding layer, said patterned structure having a plurality of angled surfaces, at least two of said angled surfaces being in an opposing relationship;

forming a first patterned core layer in the area between said at least two angled surfaces;

forming a second cladding layer over said first core layer;

forming a second patterned core layer over said second cladding layer, said second patterned core layer having at least one angled surface for redirecting between said first and second patterned core layers;

forming a third cladding layer over said second patterned core layer.

32. The method of claim 31, further comprising forming at least one vertical optical via in said interconnect structure for directing light into or out of the structure in a direction which is orthogonal to the plane defined by said substrate.

33. The method of claim 31 further comprising the step of depositing a reflective material on said angled surfaces.

34. The method of claim 31 wherein each of said layers comprises a polymer.